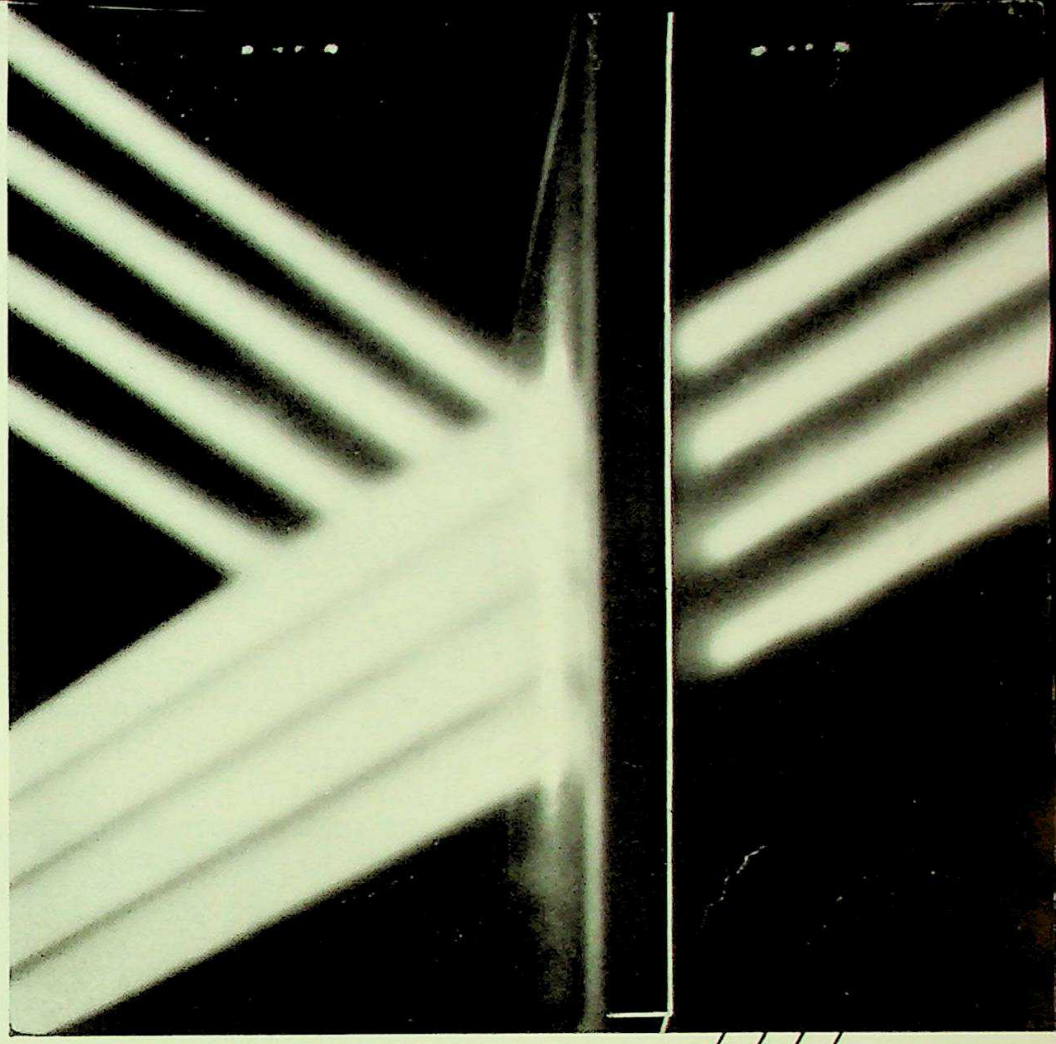
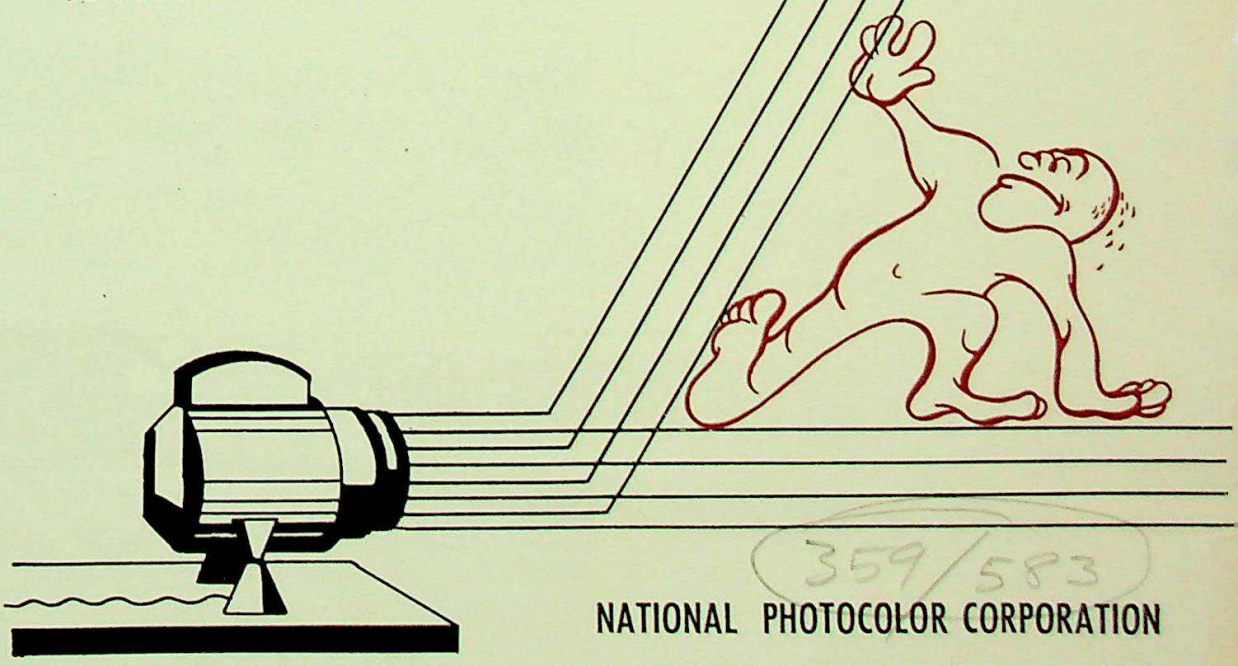


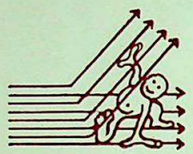
BEAM SPLITTING— *with* NPC PELLICLES



359/583

NATIONAL PHOTOCOLOR CORPORATION

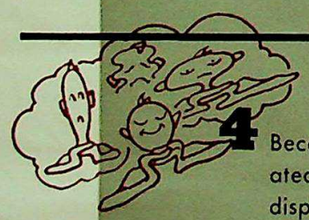
WHY USE AN NPC PELLICLE ?



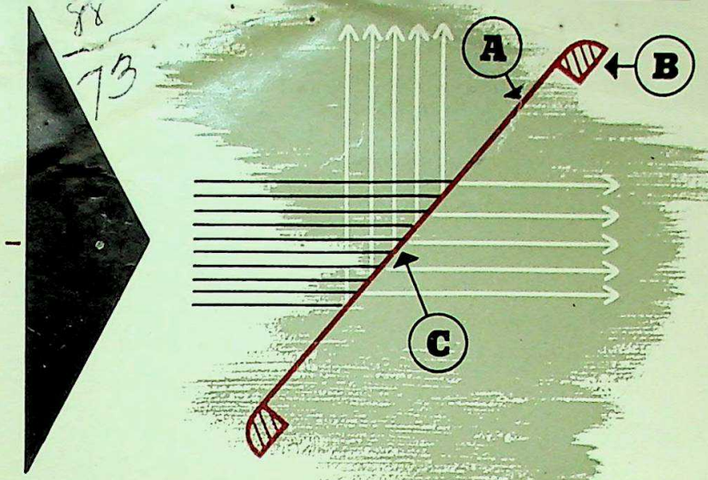
1 Because AS A BEAM-SPLITTER, the partially reflecting NPC pellicle mirror has many advantages. It will do everything a glass mirror can do—and many things which a glass mirror cannot do.

2 Because LARGE MIRRORS of optically flat quality are readily available. They are light in weight, easily mounted, and inexpensive. One of the standard sizes is 5"x7". A glass flat of this size would be thick, heavy and excessively expensive.

3 Because GHOST IMAGES disappear with NPC pellicles; or more exactly, the "ghost" coincides with the image because the pellicle mirrors are so thin. None of the "ghosts" so troublesome with glass mirrors are present.



4 Because REFRACTIVE ERRORS are eliminated. NPC pellicles are so thin that the displacement of rays passing through them is negligible. With glass mirrors refractive distortions are unavoidable and are frequently serious.



Received o... before July 1962

A The Pellicle: a very tough, elastic membrane; transparent as glass. Its thickness is about 3/10,000 of an inch; it is uniform over the entire area to within a few wavelengths of light.

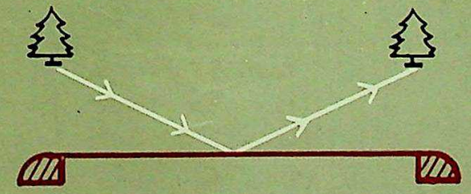
B The Frame: open like a picture frame, with a carefully lapped edge over which the pellicle is stretched taut. Since it is stretched over a flat frame, the pellicle surface is flat all over, regardless of size.

C The Reflection Ratio: controlled coating permits just the "split" desired. NO LOSS coatings are available if needed.

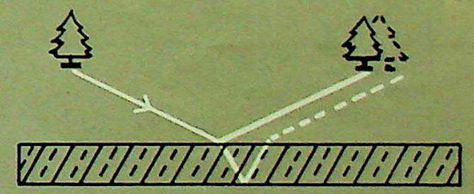
PELLICLE

GLASS

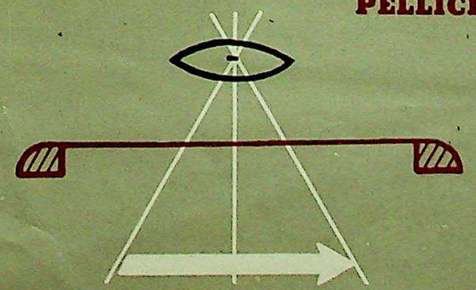
PELLICLE



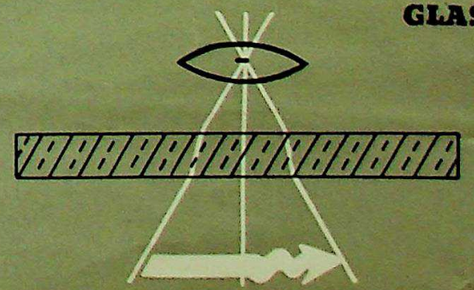
GLASS



PELLICLE



GLASS



- In war equipment where superimposition of various optical figures is necessary. The optical quality and shatter-proof properties of NPC pellicles have been found to be highly advantageous in such applications.
- In telescopes and other viewing instruments where two phenomena are to be observed simultaneously, or when an illuminated scale is to be superimposed on the object under inspection.
- In One-Shot Color Cameras to fractionate the light into three beams, thus providing for the simultaneous exposure of three different color separation negatives.

TECHNICAL SPECIFICATIONS:

,00508 mm

THICKNESS—Pellicles are available in thicknesses from 0.0002 to 0.001 inches, as specified; uniform to within a few wavelengths of light; no striations.

REFLECTANCE—Pellicle mirrors may be supplied for any reflectance between 8% and 50% at the desired reflection-transmission ratio. There is appreciable absorption at the higher reflectances with the standard coating. The NO LOSS coating is substantially free from absorption losses even at higher reflectances.

COMPOSITION—Several types of pellicles, different in respect to chemical composition, are available. These vary in organic solubility and in elasticity, and to some degree in their optical properties.

STRENGTH AND STABILITY—Pellicles not affected by climatic variations or mechanical shock, but should be protected from dust or spray.

MIRROR SIZE—The largest standard size in which pellicles are supplied is 5"x7". Pellicles as small as ¼" may be mounted on appropriate frames.

FRAME—Pellicles may be mounted on almost any shape frame. Special designs worked out to fit requirements. Standard frames are of cast aluminum with open areas 3¼"x4¼" and 5"x7".

COLOR—Dyes can be incorporated into the pellicle to transmit selected colors only.

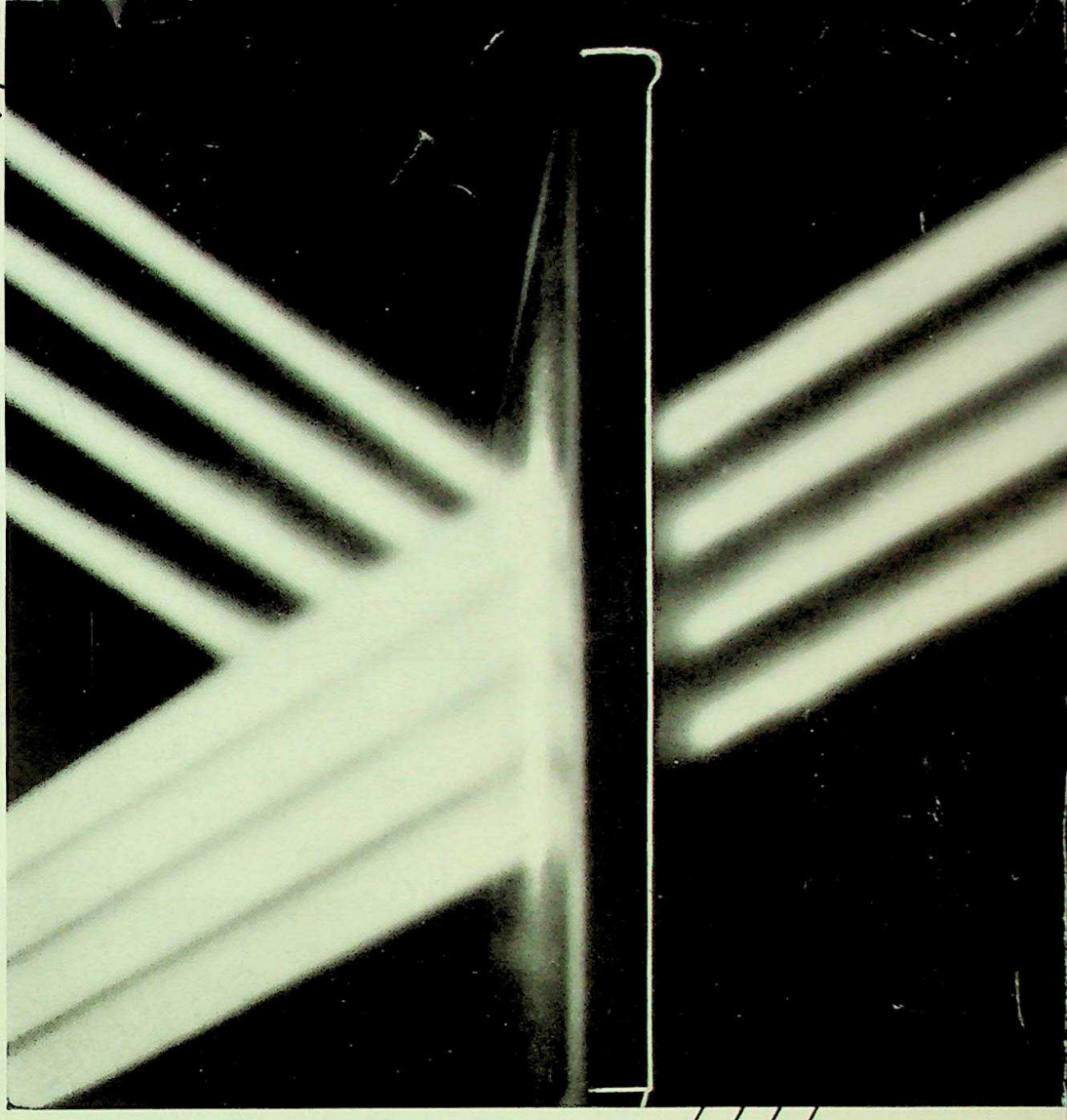
INVITATION TO DEVELOPMENT AND PRODUCT ENGINEERS:

If your product designs call for beam-splitters, we shall be glad to discuss with you the ways in which NPC pellicles may be used. They are durable, high quality mirrors, inexpensive, and easy to mount. Remember NPC pellicles—the "zero-thickness" mirror of optical flat quality.

for further information, write to:

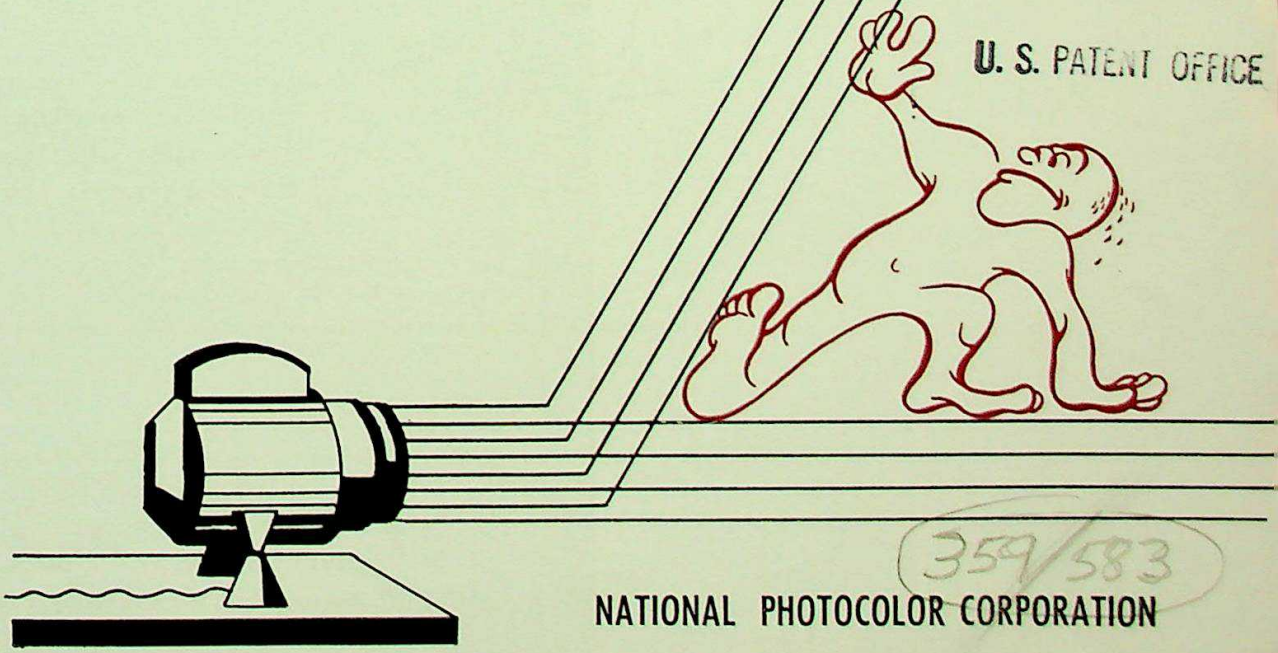
NATIONAL PHOTOCOLOR CORPORATION
225 East 44th Street, New York 17, N. Y.

88/1 359-583 (M.I.) PUBL
~~350/164~~



BEAM SPLITTING— *with* NPC PELLICLES

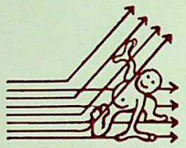
DIVISION 7
APR 8 1960
U. S. PATENT OFFICE



359/583

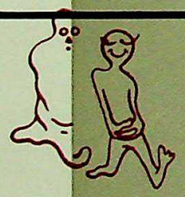
NATIONAL PHOTOCOLOR CORPORATION

WHY USE AN NPC PELLICLE ?

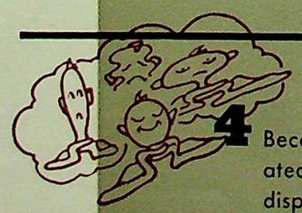


1 Because AS A BEAM-SPLITTER, the partially reflecting NPC pellicle mirror has many advantages. It will do everything a glass mirror can do—and many things which a glass mirror cannot do.

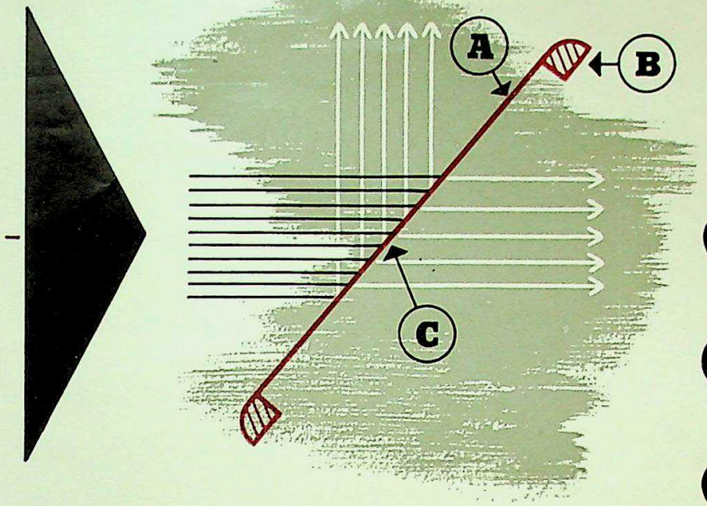
2 Because LARGE MIRRORS of optically flat quality are readily available. They are light in weight, easily mounted, and inexpensive. One of the standard sizes is 5"x7". A glass flat of this size would be thick, heavy and excessively expensive.



3 Because GHOST IMAGES disappear with NPC pellicles; or more exactly, the "ghost" coincides with the image because the pellicle mirrors are so thin. None of the "ghosts" so troublesome with glass mirrors are present.



4 Because REFRACTIVE ERRORS are eliminated. NPC pellicles are so thin that the displacement of rays passing through them is negligible. With glass mirrors refractive distortions are unavoidable and are frequently serious.



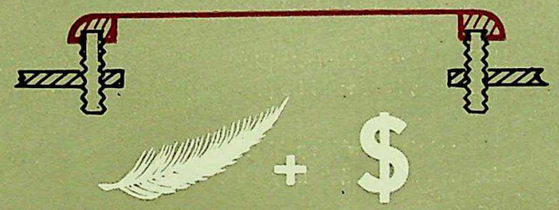
DIVISION 7
APR 8 1960
U. S. PATENT OFFICE

A The Pellicle: a very tough, elastic membrane; transparent as glass. Its thickness is about 3/10,000 of an inch; it is uniform over the entire area to within a few wavelengths of light.

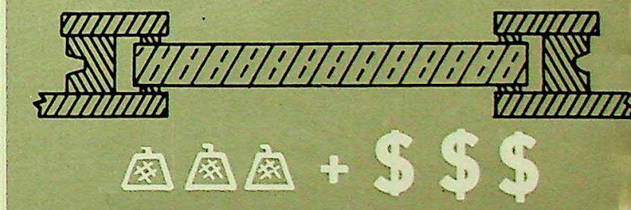
B The Frame: open like a picture frame, with a carefully lapped edge over which the pellicle is stretched taut. Since it is stretched over a flat frame, the pellicle surface is flat all over, regardless of size.

C The Reflection Ratio: controlled coating permits just the "split" desired. NO LOSS coatings are available if needed.

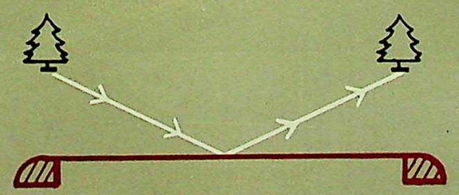
PELLICLE



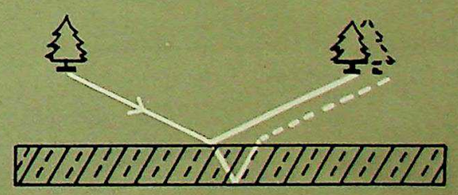
GLASS



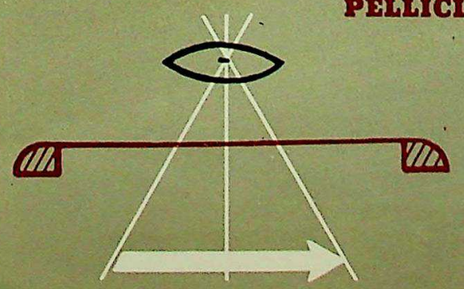
PELLICLE



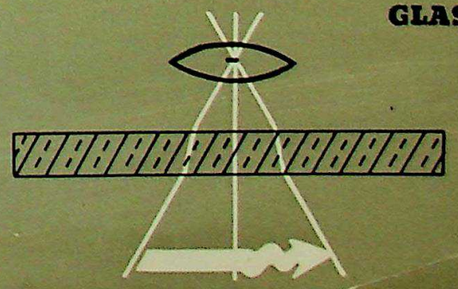
GLASS



PELLICLE



GLASS



SOME PRESENT APPLICATIONS OF BEAM-SPLITTING PELLICLES:

- In war equipment where superimposition of various optical figures is necessary. The optical quality and shatter-proof properties of NPC pellicles have been found to be highly advantageous in such applications.
- In telescopes and other viewing instruments where two phenomena are to be observed simultaneously, or when an illuminated scale is to be superimposed on the object under inspection.
- In One-Shot Color Cameras to fractionate the light into three beams, thus providing for the simultaneous exposure of three different color separation negatives.

TECHNICAL SPECIFICATIONS:

THICKNESS—Pellicles are available in thicknesses from 0.0002 to 0.001 inches, as specified; uniform to within a few wavelengths of light; no striations.

REFLECTANCE—Pellicle mirrors may be supplied for any reflectance between 8% and 50% at the desired reflection-transmission ratio. There is appreciable absorption at the higher reflectances with the standard coating. The NO LOSS coating is substantially free from absorption losses even at higher reflectances.

COMPOSITION—Several types of pellicles, different in respect to chemical composition, are available. These vary in organic solubility and in elasticity, and to some degree in their optical properties.

STRENGTH AND STABILITY—Pellicles not affected by climatic variations or mechanical shock, but should be protected from dust or spray.

MIRROR SIZE—The largest standard size in which pellicles are supplied is 5"x7". Pellicles as small as ¼" may be mounted on appropriate frames.

FRAME—Pellicles may be mounted on almost any shape frame. Special designs worked out to fit requirements. Standard frames are of cast aluminum with open areas 3¼"x4¼" and 5"x7".

COLOR—Dyes can be incorporated into the pellicle to transmit selected colors only.

DIVISION 7
APR 8 1960
U. S. PATENT OFFICE

INVITATION TO DEVELOPMENT AND PRODUCT ENGINEERS:

If your product designs call for beam-splitters, we shall be glad to discuss with you the ways in which NPC pellicles may be used. They are durable, high quality mirrors, inexpensive, and easy to mount. Remember NPC pellicles—the "zero-thickness" mirror of optical flat quality.

for further information, write to:

NATIONAL PHOTOCOLOR CORPORATION
225 East 44th Street, New York 17, N. Y.

359 --- ~~350/166~~ --- ,00762 mm ---

583 National Photocolor Corporation pellicle beam-splitters consist of clear cast plastic films of optical quality approximately 0.0003" thick cemented under tension to metal frames which have been lapped optically flat. The advantage of such beam-splitters over the thinnest glass ones obtainable is that there is no appreciable separation of the first and second surface reflections or distortion by refraction. However, they are easily marred and should be enclosed to avoid contacts and dust.

A clear pellicle reflects about 5% and transmits 95% of the incident light. Two types of neutral reflective coating can be applied by vacuum evaporation: -Aluminum with R : T ranging from 16% : 64% to 33% : 33%; (There is considerable absorbtion increasing to 1/3 of the light at the 1 : 1 ratio); A zinc sulphide "no loss" coating with R : T ranging from 15% : 85 : to 33% : 67%. At greater coating thickness R becomes yellowish and T bluish. A third color-selective coating of antimony sulphide has R max. of 55% at 520 mu which is visually neutral, but T is distinctly brownish increasing to over 55% beyond 650 mu. Thinner coatings have bluish R and yellowish T.

Pellicle beam-splitters can be supplied mounted on simple rings or rectangular frames machined from Dural tube or flat stock. The frame sides must be at least 3/16" square in section to assure rigidity (more for large frames) and are bevelled 10° to the surface plane so that a thin inner edge may be ground optically flat to bear the pellicle. The back of the frame is tapped diametrically for attaching to a shipping container and final mounting. The minimum aperture should be at least 1" since minute dust specks trapped between frame and pellicle may distort the surface to 1/8" from the edge. More specialized frames must be supplied by the customer with due regard to the feasibility of mounting a pellicle. Note: Pellicle beam-splitters must be insulated from mechanical vibration which may cause resonance. They will exhibit Haidinger interference fringes when used with monochromatic light. They are inflammable at high temperatures.